UNIVERSITY OF DUBLIN

TRINITY COLLEGE

FACULTY OF ENGINEERING, MATHEMATICS & SCIENCE

SCHOOL OF COMPUTER SCIENCE & STATISTICS
SCHOOL OF ENGINEERING

CA Quiz no. 2 **Michaelmas Term**

NEXT GENERATION NETWORKS (CS4031/CS7NS3/EEU44C04/EEP55C27)

Date: 30 November 2023 **Venue: Lloyd, LB01** **Time: 12.00 – 12.50**

STUDENT'S FIRST NAME	
STUDENT'S SURNAME	
STUDENT'S NUMBER	

Please answer ALL THE TEN questions.

1. *In the case of Ethernet traffic, which one among the following models would show a drastic increase in the queue size at higher values of the utilization ρ ?*
   a) Statistical self-similar model with Hurst parameter H = 0.9
   b) Statistical self-similar model with Hurst parameter H = 0.75
   c) M / D / 1 model
   d) M / M / 1 model

2. *Which one among the following equations, correctly expresses the Little's law relating the expected number in the system $E[n]$, the average time spent in the system $E[\tau]$, and the arrival rate λ ?*
   a) $E[\tau] = E[n]/\lambda$
   b) $E[n] = E[\tau]/\lambda$
   c) $E[n] = \lambda^2 E[\tau]$
   d) None of the above

3. *In the case of a 5G smart energy grid, which one among the following requirements is **least** important?*
   a) Coverage
   b) Reliability
   c) Deployment density
   d) Mobility

4. *If we were to deploy a Low Power Wide Area Network (LPWAN), which one among the following standards would require a higher investment in terms of RF spectrum acquisition?*
   a) LORA
   b) LTE NB-IoT
   c) RPMA
   d) SIGFOX

5. *Which one among the following statements is **wrong** in relation to the M/M/∞ queuing system, where μ is the service rate ?*
   a) The system can handle any value of arrival rate λ
   b) The expected number in the system is entirely determined by λ/μ
   c) The average delay per customer is given by the reciprocal of μ
   d) None of the above

6. *Which of the following statements is **false** with respect to PON upstream allocation?*
   - **a)** It is carried out by the OLT by running a Dynamic Bandwidth Allocation algorithm
   - **b)** It can be based either on status reporting or on traffic monitoring
   - **c)** It is carried out in two phases, and it involves the setup of a ranging window
   - **d)** It supports fixed capacity allocations

7. *Which of the following statements is **false** with respect to the development of residential broadband?*
   - **a)** Copper-based technologies are limited by the signal to noise ratio
   - **b)** In copper transmission, the signal to noise ratio of a signal decreases with distance, but the available bandwidth does not
   - **c)** Access broadband has developed over the concept of progressively shortening the distance the signal travels in copper
   - **d)** G.FAST improves over precedent technologies for short distances rather than for long ones

8. *Which of the following statements is **false** with respect to schedulers for quality of service?*
   - **a)** Priority-based deficit weighted round robin allows to define both strict priority and relative priority for queues
   - **b)** Random Early Discard is as action that if active is carried out before the scheduler
   - **c)** The task of a scheduler is to pick packets selectively from different queues
   - **d)** The task of a scheduler is to priorities packets by re-sorting them within a given queue

9. *Which of the following statements is **false** with respect to metering and coloring?*
   - **a)** In the color aware implementation, a packet previously marked as yellow can not enter the green queue
   - **b)** In the color aware implementation, a packet previously marked as green can enter the yellow queue
   - **c)** In the color blind implementation, a packet previously marked as yellow can not enter the green queue
   - **d)** In the color blind implementation, a packet previously marked as green can enter the yellow queue

10. *Which of the following statements is **false** with respect to fixed-mobile convergence?*
    - **a)** The latency requirements for fronthaul are progressively more relaxed as we move, step by step, from split 8 (or E) towards split 1 (or A)
    - **b)** The Dynamic Bandwidth Allocation algorithm in the PON causes delays that are too high to support a split 8 fronthaul transmission
    - **c)** The data rate of a split 8 implementation is very high because it transmits digital samples of the radio waveform
    - **d)** The RAN Intelligent Controller is a distinguishing feature of Open RAN.